
Probability and PDEs
Probabilité et EDP

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YURI BAKHTIN, Courant Institute NYU

RALUCA BALAN, University of Ottawa
Recent advances for SPDEs with Lévy noise

In this talk, we introduce a new class of processes that can be used as noise for stochastic partial differential equations (SPDEs). This noise is called the “Lévy colored noise”, and is constructed from a Lévy white noise using the convolution with a suitable spatial kernel. We assume that the Lévy measure of the noise has finite variance. The stochastic integral with respect to this noise is constructed similarly to the integral with respect to the spatially-homogeneous Gaussian case considered in Dalang (1999). Using Rosenthal’s inequality, we provide an upper bound for the p -th moment of the stochastic integral with respect to this noise. Then, we analyze the existence of moments for linear and non-linear SPDE with this noise, considering as examples the stochastic heat and wave equations. This talk is based on joint work with Juan Jiménez.

BJOERN BRINGMANN, Princeton University
Global well-posedness of the stochastic Abelian-Higgs equations in two dimensions

There has been much recent progress on the local solution theory for geometric singular SPDEs. However, the global theory is still largely open. In this talk, we discuss the global well-posedness of the stochastic Abelian-Higgs model in two dimension, which is a geometric singular SPDE arising from gauge theory. This is joint work with S. Cao.

FRANCESCO CELLAROSI, Queen’s University
Stochastic Calculus for the Theta Process

A key step in stochastic analysis is the “art” of giving meaning to integrals against a random function. This is not a trivial task, since interesting random functions have poor regularity and Riemann-type approaches typically do not work. Sometimes, we may exploit the martingale-like properties of our random functions to give meaning to integrals against them. Alternatively, we may employ Rough Path Theory to define stochastic integration, trading some of the nice probabilistic properties for analytical and algebraic ones. I will outline how this is done in the case of the Theta Process. This is a stochastic process of number-theoretical origin that shares several (but not all!) properties with the Brownian Motion, and classical probabilistic tools to define a stochastic calculus for this process cannot be used. Joint work with Zachary Selk (<https://arxiv.org/abs/2406.05523>)

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